THURSDAY, JULY 21, 1887.

THE MINING INDUSTRY OF NEW ZEALAND.

Report on the Mining Industry of New Zealand. (Papers laid before Parliament, Session 1886.) 8vo, pp. 334. (Wellington, New Zealand, 1887.)

The Hand-book of New Zealand Mines. With Maps and Illustrations. 8vo, pp. 519. (Wellington, New Zealand, 1887.)

THESE volumes, which cover the same ground, and to some extent reproduce the same information, are in great part the result of a personal investigation of the mining districts of our great antipodean colony, made by the Hon. Mr. W. J. M. Larnach, C.M.G., the Minister of Mines. From the Report, which is about six months older than the Hand-book, we learn that the latter has been compiled by the officers of the Mining Department, under the direction of the Minister, in order to furnish systematic information as to the area of mining claims, and as to other particulars concerning the working of mines, which has not hitherto been available. This result has been fairly well attained in the volume before us, which is a valuable summary, arranged topographically, of the condition of the mines actually at work, the description of each district being preceded by an historical sketch of the early explorations. Among these, that describing the progress of discovery on the west coast of the Middle Island is especially interesting, as it goes back as far as 1836, when an early settler, named Toms, "on one occasion was caught and thrown down by a large seal, receiving a severe bite on the thigh, but he escaped death by dealing it some hard blows with his fist on the nose." Other and more serious difficulties were encountered from the opposition of the native inhabitants, whose interests were finally purchased by Sir George Grey and the successive Governors, subject to certain reserves, which at the present time produce an income of about £4000 per annum, and as there are only about a hundred natives on the west coast, they are comfortably fed, housed, and clad, peaceable and sober, and generally respected by their European neighbours. From this part of the colony gold was exported of the value of nearly £12,000,000 sterling between 1864 and 1873, and the yield, though diminished, still continues, with the prospect that the product of alluvial rocks will be more than eclipsed by that of the quartz reefs, some of which have been proved to be extraordinarily rich. The total produce of gold in New Zealand between 1853 and the end of 1885, according to the Report, is 10,789,560 ounces, valued at £42,327,907 sterling, and the Hand-book gives the area of country proved to be auriferous in the three islands as about 21,000 square miles.

The product next in importance to gold, although perhaps it is scarcely to be classed as a mineral, is kauri gum, which is produced at the rate of about 6000 tons annually from deposits in the North Island, which have already yielded upwards of £3,500,000 sterling to the wealth of the colony. The prosperity of Auckland has been largely aided by its kauri gum fields, and the valuable kauri tree, which is only found in the northern forests of the North Island.

The coal of New Zealand seems to be largely of the character of lignite, though some portion is of a more highly carbonaceous character. The output at present is little in excess of 500,000 tons, which suffices for about three-quarters of the consumption of the colony. Several other minerals have been produced in small quantities, but their aggregate value is insignificant when compared with that of the three staples noticed above.

In going over the detailed accounts of the different gold-mines, given in both volumes, we cannot but be struck by the great diversity of the character of the deposits, and this, as might be expected, has led to several interesting modifications in the method of working. Among the more remarkable of these are, the use of a steam dredger for working auriferous alluvial gravels in the channel of the Molyneux River, and a method of lifting similar materials by a water-jet aspirator applied at Gabriel's gully in the Tuapeka district. These are described at some length, but the descriptions and illustrations are not as full and precise as they might be, considering the interest of the subjects. Another novelty is the use of electricity on the large scale for driving a stamping mill at the Phenix Mine, in Otago. The current produced by a pair of turbines of about 100 horse-power and two Brush dynamos is transmitted to a distance of about two miles to the crushing battery, which contains thirty heads of stamps and is driven by a Victoria electromotor and a Leffel turbine conjointly. This is probably the largest application of electric power to mining purposes that has yet been made.

Mining in New Zealand appears to receive greater support from the State than is customary in most other countries, as not only are large sums devoted to the opening up of roads and pack trails through the country, but contributions are made towards the construction of water races and channels for tailings, and subsidies are paid towards prospecting in different localities. These grants are made contingently upon much larger sums being furnished by local or individual effort, and, according to the testimony of the Reports, have been of great value in encouraging discoverers.

A point of interest in connexion with the economics of New Zealand mining is the general establishment of local schools of mines, or, as they are called in some localities, chemistry clubs, in the different mining centres. These are organized apparently on a system somewhat similar to that of the science classes of the Science and Art Department, the instruction being given to the members by means of a staff of seven teachers under the charge of Prof. J. G. Black, of the University of Otago, who travels through the different districts giving lectures and laboratory demonstrations, for periods varying from two to five months at each, according to its size and importance. The course of instruction includes mineral chemistry and assaying, mineralogy and metallurgy, and provision is being made for the addition of the subjects of mining engineering and surveying. The results expected from the scheme are set forth in full, from which it appears that miners will be able to assay ores and metals of every kind, be able to assay their own bullion, and become generally familiar with the metal-

© 1887 Nature Publishing Group

lurgy of the precious metals. Such results will probably not be realized in their entirety, neither is it desirable that they should be, as the presence of a well-educated specialist, an assayer or smelter, for example, may often be of more permanent value to a district than the necessarily superficial knowledge of subjects not immediately connected with their own occupation that the local miners are likely to acquire under the scheme; but there can be no doubt that great good will result from giving them an intelligent interest in mineralogy, and the observation of the phenomena brought under their notice when at their own particular work.

The Hand-book concludes with a description of the principal forest trees of New Zealand, taken from Dr. Hector's "Hand-book of New Zealand." It has also several maps, supplied by Dr. Hector and Mr. Gordon, of the Mines Department. The greater part of the material has been collected by Mr Patrick Galvin, of Wellington.

We are sorry to see that in the final paragraphs of the preface, Mr. Larnach appeals to the honourable gentleman who may succeed him to improve the work in a second edition; from which we infer that the author has fallen a victim to a Ministerial crisis. If it be so, we have to thank him for what he has done, but if not, we hope that he may have the opportunity of extending and improving the work which he has so worthily begun, instead of leaving it to his successor. H. B.

A CENTURY OF ELECTRICITY.

A Century of Electricity. By T. C. Mendenhall. (London: Macmillan and Co., 1887.)

IN this readable little work, Prof. Mendenhall has striven to depict the origin and growth of many of the modern electric appliances—the telegraph, the dynamo, the telephone, and the electric lamp. He opens with a felicitous quotation from Benjamin Franklin describing with characteristic humour a proposal to hold an electrical party of pleasure on the banks of the Skuylkil, when the healths of all the famous electricians in England, Holland, France, and Germany are to be "drank" in electrified bumpers, under the discharge of guns from the electrical battery. This is followed by a very interesting account of the early development of the experimental science, and in particular of the work of Gilbert and of Franklin. It is satisfactory to note that for once Gilbert's just fame as the creator of the double science of electricity and magnetism is recognized, and his pre-Baconian use and development of the experimental and deductive methods of philosophizing acknowledged. The discoveries of Galvani, Volta, Oersted, and Ampère are set forth in a style which, while losing nothing in accuracy of description, is enlivened by pleasant biographical touches. Speaking of the week during which Ampère wrought out to such brilliant conclusions the train of ideas suggested by Oersted's discovery of the electric deflexion of the magnet, Prof. Mendenhall observes: "It is safe to say that the science has at no other time advanced with such tremendous strides as during that memorable week." The work of Sturgeon in inventing, and of Henry in perfecting, the electro-magnet is duly noted; but we miss, in connexion with electro-magnetic subjects, the name of Prof. Cumming, who did so much to expand and define the growing science

The vexed question, Who invented the electric telegraph? is here reached, and is very carefully handled. Prof. Mendenhall's frank impartiality in touching on this and sundry other delicate topics of contested priority is worthy of praise. *A propos* of the part taken by Henry in the invention of the electric telegraph, the author gives a sketch of Henry's arrangement of a bell for receiving electric signals, with a polarized lever to strike the bell, as it was exhibited in Albany in 1832. The most technical part of the work is that dealing with duplex and multiplex telegraphy, which is very fully treated, though here we miss the name of La Cour, who preceded Delany in the synchronous distribution of currents. Sir William Thomson's labours in submarine telegraphy, and those of Gaston Planté on accumulators, are emphasized, but not unduly. Respecting the telephone, after noting the early work of Page and the similarity between Reis's telephone transmitter and those used to-day, the author turns to the work of Elisha Gray and Graham Bell in the following terms:—"By a curious coincidence Mr. Gray deposited his specifications and drawings for a speaking-telephone in the United States Patent Office, in the form of a caveat, on February 14, 1876; and on the same day Mr. Bell filed his application for a patent, the latter being received a few hours earlier than the former. The coincidence becomes more interesting when it is remembered that it was also on February 14, 1867, that Wheatstone and Siemens simultaneously presented to the Royal Society their independent discovery of the important fact that dynamo-electric machines could be constructed and operated without the use of permanent magnets." The double coincidence of dates is certainly curious; but the significance of it is marred when we remember, first, that both Wheatstone and Siemens must yield priority of date to Varley, who patented the same discovery on December 24, 1866; and, secondly, that the apparatus described by Bell in the patent application of February 14, 1876, was one in which a separate instrument was employed for every pitch, "each instrument being capable of transmitting or receiving but a single note," and therefore did not describe a speaking-telephone at all. Bell's patent for "the transmission by the same means of articulate speech" was only applied for some ten months later. Due credit is given to Hughes for his well-known research on the microphone, to Edison for his button of lampblack, and to Dolbear for the invention of the electrostatic receiver. The chapter on the electric light is all too short, and might with advantage be expanded. Faraday's splendid discovery of magneto-electric induction, leading to the invention of the dynamo, is admirably recounted, and the important part played by modern American constructors of powerful machines is modestly narrated. A similar remark will apply to the paragraphs upon electric motors, a department of electro-technics which America is likely to make peculiarly her own.

When we reflect that the rapid introduction into British industries of the gas-engine is slow compared with the tremendous rate at which electric motors are being everywhere brought into use in the States, we think that Prof. Mendenhall has under-rated rather than overrated the importance of this item in his account of the

© 1887 Nature Publishing Group